MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

BMM 1014 – MATHEMATICS FOR MANAGERS

(All Sections / Groups)

25 OCTOBER 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with 4 questions only.
2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. Formulae are attached at the end of the question paper.

QUESTION 1

(a) A company that manufactures dress has weekly fixed costs of RM 80,000 associated with the production cost of RM 25 per dress. The company sells all the dresses it produces at RM 75 per dress.

(i) Find the cost, revenue, and profit equations if x is the number of dresses produced per week. (3 marks)

(ii) Find the weekly break-even quantity. (2 marks)

(iii) If the company is making a loss of RM 50,000 per week, how many additional dresses need to be manufactured and sold to make a profit of RM 25,000? (4 marks)

(iv) If the company was able to sell 3003 dresses, what price should be charged in order to break even? (3 marks)

(b) Alex's Fruit Mart sells variety packs. The small pack contains 12 bananas, 3 apples, and 4 oranges for RM 33. The medium pack contains 18 bananas, 7 apples, and 6 oranges for RM 55. The jumbo pack contains 18 bananas, 11 apples, and 10 oranges for RM 77. What price should Alex charge for his lunch-box special that consists of three bananas, two apples, and one orange? (13 marks)

(Total: 25 marks)

Continued...

QUESTION 2

Ahmad has set up a new tuition centre located at Taman Bukit Beruang mainly which focuses on teaching Science and Mathematics for primary and secondary students. The tuition centre can take in maximum of 480 students. The number of students taking mathematics is two times more than the number of students taking science. The maximum number of students taking science is not more than 120 students. The fee for science is RM60 per student and mathematics is RM 50 per student.

(a) Formulate a linear programing model of this problem. (6 marks)

(b) Graph and show the feasible region of the above problem clearly. (5 marks)

(c) How many students for each subject should be taken in order to maximise the amount of fees? What is the maximum amount of fees collected by the tuition centre? (9 marks)

(d) If the fee for mathematics change to RM65 per student, will the optimum solution change? If yes, what is the new optimum solution and maximum amount of fees collected? (5 marks)

(Total: 25 marks)

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QUESTION 3

(a) Christine would like to borrow RM 15,800 from her parents in order for her to start an online business. She is planning to repay the loan in 22 months. She will pay a simple interest of 6.35% per annum to her parents. What is the total amount of money that she need to pay back to her parents? (3 marks)

(b) Cheong want to have RM 48,000 available in 3 years for a downpayment on the purchase of a house. How much he has to invest into a fund now if the fund pays an interest rate of 4.9% compounded quarterly? (4 marks)

(c) An investor has put RM 55,000 into a trust fund that pay interest compounded continuously. He has received an amount of RM 684,000 at the end of 30 years. What is the interest rate that paid by the trust fund? (5 years)

(d) Ten years ago, Tan bought a double storey terrace house at a price of RM 538,900. At that time, he has secured a 35 years mortgage loan from a bank at a rate of 4.22% per year compounded monthly. His approved loan amount from the bank is 90% of the house price.

(i) How much do Tan need to pay for his monthly mortgage payment? (5 marks)

(ii) What is Tan's current outstanding principal? (3 marks)

This year, Tan is thinking of refinancing his property as the interest rate for a conventional 30 years home mortgage has now dropped to 4% per year compounded monthly.

(iii) If Tan decides to refinance his property by securing a 30 year home mortgage loan in the current outstanding principal, what will be his monthly mortgage payment? (3 marks)

(iv) How much less Tan can save for his monthly mortgage payment if he chooses to refinance? (2 marks)

(Total: 25 marks)

Continued...

QUESTION 4

(a) A furniture company makes computer chairs. For a certain model, the total cost (in thousands of Ringgit Malaysia) when x hundred chairs are produced is given by

$$C(x) = 6x^3 - 99x^2 + 540x$$

Find the value of x that leads to minimum cost. What is the minimum cost?

(8 marks)

(b) Smart Choice Company produces two kinds of calculators: scientific calculator and financial calculator. With x denotes thousands of scientific calculators and y denotes thousands of financial calculators, the total revenue $R(x,y)$and the total cost $C(x,y)$, both in thousands of Ringgit Malaysia are given as follows:

$$R(x,y) = 60x + 55y$$

$$C(x,y) = 8x^2 - 8xy + 4y^2 - 12x + 39y + 90$$

Find the number of each type of calculators that must be produced and sold in order to maximize its profit. What is the maximum profit realizable? (12 marks)

(c) Evaluate the following integral:

$$\int (x^4 - 2x^2)^5 (x^3 - x)dx$$

(5 marks)

(Total: 25 marks)

End of Paper

LIST OF FORMULA

1. Quadratic Formula

The solution of the equation:
$ax^2 + bx + c = 0$,
$a \neq 0$, are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Simple Interest

Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
Accumulated amount, $A = P(1 + rt)$

3. Compound Interest

Accumulated amount, $A = P(1 + i)^n$, where $i = r/m$, and $n = mt$ (m = number of conversion periods per year)

4. Continuous Compound Interest

$A = Pe^{rt}$

5. Effective Rate of Interest

$r_{eff} = (1 + r/m)^m - 1$

6. Present Value for Compound Interest

$P = A(1 + i)^{-n}$

7. Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

(S = future value of ordinary annuity of n payments of R dollars periodic payment)

8. Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

(P = present value of ordinary annuity of n payments of R dollars periodic payment)

9. Amortization Formula

$$R = \left[\frac{Pi}{1-(1+i)^{-n}} \right]$$

(R = periodic payment on a loan of P dollars to be amortized over n periods)

10. Sinking Fund Formula

$$R = \left[\frac{Si}{(1+i)^{n}-1} \right]$$

(R = periodic payment required to accumulate S dollars over n periods)

Calculus

11. Product rule

$$f(x) = u(x).v(x)$$

$$f'(x) = u(x).\frac{dv}{dx} + v(x).\frac{du}{dx}$$

12. Quotient rule

$$f(x) = \frac{u(x)}{v(x)}$$

$$f'(x) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{[v(x)]^2}$$